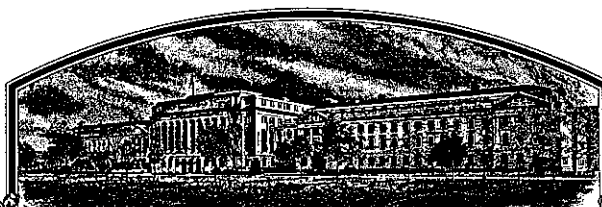


No.

8500105



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Rohm and Haas Seeds, Inc.**

Whereas, THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (T. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Norak'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D. C. this *11th* day of *March* in the year of our Lord one thousand nine hundred and eighty-eight.

Attest:

*Kenneth W. Evans*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*Richard E. Lyng*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

APPROVAL EXPIRES 4-30-86

FORM APPROVED: OMB NO. 0581-0055

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) Rohm & Haas Seeds Inc.		2. TEMPORARY DESIGNATION 77S 8002		3. VARIETY NAME Norak	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) Independence Mall West Philadelphia, PA 19105		5. PHONE (Include area code) (215) 592-3113		FOR OFFICIAL USE ONLY PVPO NUMBER 8500105	
6. GENUS AND SPECIES NAME Triticum aestivum L.		7. FAMILY NAME (Botanical) Gramineae		FILING DATE 4/12/85 TIME 8:30 <input checked="" type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
8. KIND NAME Common Wheat		9. DATE OF DETERMINATION September 1981		AMOUNT FOR FILING \$ 1,800 DATE 4/12/85	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Corporation				AMOUNT FOR CERTIFICATE \$ 200.00 DATE February 22, 1988	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION Delaware				12. DATE OF INCORPORATION February, 1983	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS <del>Dr. James E. Stroike</del> POLLY E. RAMSTAD, ESQ. Rohm and Haas Seeds Inc. Independence Mall West Philadelphia, PA 19105 PHONE (Include area code): (215) 592-3113					
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED					
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)					
b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement.					
c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.)					
d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety.					
e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership. (SEE EXHIBIT A)					
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) <input type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input checked="" type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> Yes <input type="checkbox"/> No			17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> Foundation <input type="checkbox"/> Registered <input type="checkbox"/> Certified		
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> Yes (If "Yes," give names of countries and dates) United States, April, 1985 <input type="checkbox"/> No					
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT James E Stroike				DATE 3/25/85	
SIGNATURE OF APPLICANT				DATE 1	

ORIGIN AND BREEDING HISTORY OF THE VARIETY

Norak is the result of hybridization and individual plant selection from the cross Era//Tobari/Ciano/3/Protor made by the Northrup King Company. The Tobari/Ciano selection utilized in the cross is a sib of Protor. Our pedigree is N7742-4A-1F-1A-OF.

We made the cross in the field at Yuma, Arizona in 1973. The F<sub>1</sub> was grown at Moorhead, Minnesota, during the summer of 1973. F<sub>2</sub> plant selections were made at Yuma followed by F<sub>3</sub> plant selection during the summer of 1974 at Moorhead. The F<sub>4</sub> generation was grown at Yuma where one plant was selected for seeding an F<sub>5</sub> row at Moorhead in 1975. This F<sub>5</sub> row was bulked for testing in our 1976 preliminary yield trials (F<sub>6</sub>) at Yuma and Moorhead. The preliminary trial at Moorhead was lost due to drought. By using seed (F<sub>7</sub>) from the 1976 Yuma trial the line was retested at Moorhead in 1977 preliminary trials as 77S 8002. The preliminary yield trial code number was retained as the permanent experimental variety number.

From 1977 to 1980 the bulk of 77S 8002 was yield tested in Minnesota. In a 1978 yield trial plot (F<sub>8</sub>) ten heads were selected to begin a head-row purification program. The F<sub>9</sub> head-rows were grown at Yuma during 1978-79. Seed from each head-row was yield tested in Minnesota in 1980 and 1981. An increase of each head-row (F<sub>10</sub>) was grown at Yuma during 1980-81.

After evaluation of each F<sub>9</sub> derived head-row, one was selected to be increased as breeders seed. This lot was increased at Yuma in 1981-82 and identified as 82ASH35002. Foundation seed produced in Arizona during the 1982-83 crop year represents an F<sub>12</sub> derived from a single F<sub>9</sub> head-row. Norak is uniform and stable.

Norak, 77S 8002, was entered in the 1982 and 1983 Uniform Regional Hard Spring Wheat Nursery by Northrup King Company. In 1982 URHRSWN tests the average yield for Norak over 15 locations was 3632 kg/ha or 106% of Era. The 1983 average yield for Norak over 17 locations was 3228 kg/ha or 101% of Era.

In July, 1984, Rohm and Haas Seeds Inc. purchased the midwest hard red spring wheat breeding germ plasm from Northrup King Company. The ownership of Norak was transferred to Rohm and Haas Seeds at this time.

## EXHIBIT B

NOVELTY STATEMENT

Norak is most similar to "Era" but differs in heading date, beak length, and resistance to leaf rust (Puccinia recondita) physiologic races observed in the field from 1979-1984 at Moorhead, MN. Heading date for Norak averages 4-5 days earlier than the heading date for Era. Beak length for Norak is typically longer than that for Era. Under similar growing conditions Norak has beaks that range from 8-16 mm in length, while Era has beaks that range from 3-7 mm in length. Adult plant resistance to leaf rust has been observed to be different than that for Era.

**U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION  
BELTSVILLE, MARYLAND 20705**

**EXHIBIT C**  
(Wheat)

**OBJECTIVE DESCRIPTION OF VARIETY  
WHEAT (TRITICUM SPP.)**

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)	FOR OFFICIAL USE ONLY
Rohm and Haas Seeds Inc.	PVPO NUMBER
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code)	8500105
Independence Mall West	VARIETY NAME OR TEMPORARY
Philadelphia, PA 19105	DESIGNATION
	Norak (77S 8002)

Place the appropriate number that describes the varietal character of this variety in the boxes below.  
Place a zero in first box (e.g.,  or  ) when number is either 99 or less or 9 or less.

**1. KIND:**

1 = COMMON    2 = DURUM    3 = EMMER    4 = SPELT    5 = POLISH    6 = POULARD    7 = CLUB

**2. TYPE:**

1 = SPRING    2 = WINTER    3 = OTHER (Specify) \_\_\_\_\_  1 = SOFT    3 = OTHER (Specify) \_\_\_\_\_  
2 = HARD

1 = WHITE    2 = RED    3 = OTHER (Specify) \_\_\_\_\_

**3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:**

FIRST FLOWERING     LAST FLOWERING

**4. MATURITY (50% Flowering):**

NO. OF DAYS EARLIER THAN .....  1 = ARTHUR    2 = SCOUT    3 = CHRIS  
 NO. OF DAYS LATER THAN .....  4 = LEMHI    5 = NUGAINES    6 = LEEDS  
7 = Era    8 = Butte

**5. PLANT HEIGHT (From soil level to top of head):**

CM. HIGH     7 = Era    8 = Butte  
 CM. TALLER THAN .....  1 = ARTHUR    2 = SCOUT    3 = CHRIS  
 CM. SHORTER THAN .....  4 = LEMHI    5 = NUGAINES    6 = LEEDS

**6. PLANT COLOR AT BOOTING (See reverse):**

1 = YELLOW GREEN    2 = GREEN    3 = BLUE GREEN

**7. ANTER COLOR:**

1 = YELLOW    2 = PURPLE

**8. STEM:**

Anthocyanin: 1 = ABSENT    2 = PRESENT     Waxy bloom: 1 = ABSENT    2 = PRESENT  
 Hairiness of last internode of rachis: 1 = ABSENT    2 = PRESENT     Internodes: 1 = HOLLOW    2 = SOLID  
 NO. OF NODES (Originating from node above ground)     CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

**9. AURICLES:**

Anthocyanin: 1 = ABSENT    2 = PRESENT     Hairiness: 1 = ABSENT    2 = PRESENT

**10. LEAF:**

Flag leaf at booting stage: 1 = ERECT    2 = RECURVED     Flag leaf: 1 = NOT TWISTED    2 = TWISTED  
3 = OTHER (Specify): \_\_\_\_\_  
 Hairs of first leaf sheath: 1 = ABSENT    2 = PRESENT     Waxy bloom of flag leaf sheath: 1 = ABSENT    2 = PRESENT  
 MM. LEAF WIDTH (First leaf below flag leaf)     CM. LEAF LENGTH (First leaf below flag leaf):

## 11. HEAD:

☐ 3 Density: 1 = LAX 2 = DENSE 3 = Middense ☐ 1 Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE  
4 = OTHER (Specify) \_\_\_\_\_

☐ 4 Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

☐ 1 Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED  
5 = BROWN 6 = BLACK 7 = OTHER (Specify) \_\_\_\_\_

☐ CM. LENGTH ☐ MM. WIDTH

## 12. GLUMES AT MATURITY:

☐ 2 Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.) ☐ 2 Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.)  
3 = WIDE (CA. 4 mm.)

☐ 6 Shoulder: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED  
shape: 4 = SQUARE 5 = ELEVATED 6 = APICULATE ☐ 3 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

## 13. COLEOPTILE COLOR:

☐ 1 1 = WHITE 2 = RED 3 = PURPLE

## 14. SEEDLING ANTHOCYANIN:

☐ 1 1 = ABSENT 2 = PRESENT

## 15. JUVENILE PLANT GROWTH HABIT:

☐ 3 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

## 16. SEED:

☐ 1 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL ☐ 1 Cheek: 1 = ROUNDED 2 = ANGULAR

☐ 2 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG ☐ 1 Brush: 1 = NOT COLLARED 2 = COLLARED

☐ 5 Phenol reaction 1 = IVORY 2 = FAWN 3 = LT. BROWN  
(See instructions): 4 = BROWN 5 = BLACK

☐ 3 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) \_\_\_\_\_

☐ 0 ☐ 6 MM. LENGTH ☐ 0 ☐ 3 MM. WIDTH ☐ 3 ☐ 2 GM. PER 1000 SEEDS

## 17. SEED CREASE:

☐ 2 Width: 1 = 60% OR LESS OF KERNEL 'WINOKA'  
2 = 80% OR LESS OF KERNEL 'CHRIS'  
3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

☐ 2 Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT'  
2 = 35% OR LESS OF KERNEL 'CHRIS'  
3 = 50% OR LESS OF KERNEL 'LEMHI'

## 18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 2 STEM RUST (Races) TLM, RKO, ☐ 2 LEAF RUST (Races) Unknown ☐ 0 STRIPE RUST (Races) ☐ LOOSE SMUT

☐ 0 RTQ, QSH ☐ BUNT ☐ OTHER (Specify) \_\_\_\_\_

☐ 0 POWDERY MILDEW

## 19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 0 SAWFLY ☐ 0 APHID (Bydv.) ☐ 0 GREEN BUG ☐ 0 CEREAL LEAF BEETLE

☐ OTHER (Specify) \_\_\_\_\_ HESSIAN FLY RACES: ☐ 0 GP ☐ 0 A ☐ 0 B ☐ 0 C  
☐ 0 D ☐ 0 E ☐ 0 F ☐ 0 G

## 20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Len	Seed size	Walera
Leaf size	Len	Seed shape	Walera
Leaf color	Protor	Coleoptile elongation	Era
Leaf carriage	Protor	Seedling pigmentation	Era

## INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

- (a) L.W. Briggles and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.
- (b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

APR 12 1985

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## EXHIBIT D

ADDITIONAL DESCRIPTION OF THE VARIETY

Norak is a cultivar of Triticum aestivum L. with spring growth habit. The shape of the kernel is ovate, and it is hard and red. The cheeks are normally rounded. The crease is midwide and mid-deep to shallow. The brush is midsize and midlong. The germs are midsize. The spike is awned, fusiform, and middense. The glumes are white, glabrous, midwide, and midlong. The glume shoulders are apiculate in shape and midwide. The beaks are acuminate in shape, midwide, and 8 to 16mm in length.

The coleoptile color is white and seedling anthocyanin is absent. Juvenile plant growth is erect. Plant color at booting is green and a waxy bloom is present on the flag leaf sheath and stem. The flag at booting is primarily erect and are twisted then later becoming recurved. Auricles can have anthocyanin in some environments and hairs are absent. The stem internodes are hollow and do not contain anthocyanin. Usually three nodes originate from the node above ground. Anther color is yellow.

The variety Norak is a semi-dwarf line with height similar to Era or slightly shorter (2-4 cm). Relative maturity is medium early. Heading date for Norak averages nearly two days later than Butte and about four days earlier than Era when grown in Minnesota. Norak is resistant to the prevalent races of stem rust (Puccinia graminis f. sp. tritici) and leaf rust (P. recondita). Seedling stem rust reactions were conducted by the Cereal Rust Laboratory in 1983. The following infection types were observed:

Variety	RACE					
	15B-2		151	11-32-113		
	TNMN	TNMK	QSHS	RHRS	RKQS	RTQQ
Norak	0;	;1	s	;	0;	s
Era	;	;	3,2	;	;	;
Butte	;	;	2-	;	2	2-

Overall milling and baking quality is satisfactory when compared to Era and Butte. Protein for Norak has been similar to Era and about 1% lower than Butte. Absorption has been nearly equal to Era and less than Butte. Mix time is longer than that for Era and Butte.

## EXHIBIT D

Table 1. Test weights of Norak in comparison to Era and Butte grown in replicated small plot trials at Moorhead, MN from 1978-1984.

Year and Experiment No.		Test Weight (Kg/hl)		
		Norak	Era	Butte
<u>1979</u>	(X62)	77.4	79.4	80.1
<u>1980</u>	(X64)	79.4	80.1	80.5
<u>1981</u>	(X76)	78.8	77.0	80.1
	(X90)	76.3	75.8	77.9
	Average	<u>77.6</u>	<u>76.4</u>	<u>79.0</u>
<u>1982</u>	(X55)	83.6	80.8	83.7
	(X57)	82.3	80.0	81.8
	(X59)	80.9	81.1	82.3
	Average	<u>82.3</u>	<u>80.6</u>	<u>82.6</u>
<u>1983</u>	(X75)	72.1	75.3	70.2
	(X77)	74.0	77.2	74.7
	Average	<u>73.1</u>	<u>76.3</u>	<u>72.5</u>
<u>1984</u>	(X54)	81.3	83.7	83.7
	(X56)	82.6	82.9	81.9
	(X58)	82.9	82.1	83.4
	Average	<u>82.3</u>	<u>82.9</u>	<u>83.0</u>
6 - Year Average		78.7	79.3	79.6



Table 2. Heading dates of Norak in comparison to Era and Butte grown in replicated small plot trials at Moorhead, MN from 1979-1984.

Year and Experiment No.		Heading Date Days from Jan. 1		
		Norak	Era	Butte
<u>1979</u>	(X62)	189	193	187
<u>1980</u>	(X64)	171	176	168
<u>1981</u>	(X76)	174	179	173
	(X90)	175	179	172
	Average	<u>174.5</u>	<u>179</u>	<u>172.5</u>
<u>1982</u>	(X55)	177	180	175
	(X57)	178	180	175
	(X59)	177	183	176
	Average	<u>177.3</u>	<u>181</u>	<u>175.3</u>
<u>1983</u>	(X75)	182	186	183
	(X77)	182	186	183
	Average	<u>182</u>	<u>186</u>	<u>183</u>
<u>1984</u>	(X54)	170	176	169
	(X56)	172	177	169
	(X58)	172	177	169
	Average	<u>171.3</u>	<u>176.7</u>	<u>169</u>
6 - Year Average		177.5	182.0	175.8

## EXHIBIT D

Table 3. Relative maturity of Norak in comparison to Era and Butte grown in replicated small plot trials at Moorhead, MN from 1979-1984.

Year and Experiment No.		Relative Maturity (1-9) <sup>1/</sup>		
		Norak	Era	Butte
<u>1979</u>	(X62)	5	6	6
<u>1980</u>	(X64)	2	5	3
<u>1981</u>	(X76)	5	7	6
	(X90)	3	5	4
	Average	$\frac{4}{4}$	$\frac{6}{6}$	$\frac{5}{5}$
<u>1982</u>	(X55)	2	3	3
	(X57)	3	4	3
	(X59)	1	5	3
	Average	$\frac{2}{2}$	$\frac{4}{4}$	$\frac{3}{3}$
<u>1983</u>	(X75)	2	3	6
	(X77)	2	4	5
	Average	$\frac{2}{2}$	$\frac{3.5}{3.5}$	$\frac{5.5}{5.5}$
<u>1984</u>	(X54)	1	6	3
	(X56)	1	5	2
	(X58)	1	3	3
	Average	$\frac{1}{1}$	$\frac{4.7}{4.7}$	$\frac{2.7}{2.7}$
6 - Year Average		2.7	4.9	4.2

<sup>1/</sup> 1-9 scale where 1=Very Early and 9=Very Late.

## EXHIBIT D

Table 4. Heights of Norak in comparison to Era and Butte grown in replicated small plot trials at Moorhead, MN from 1979-1984.

Year and Experiment No.		Height (cms)		
		Norak	Era	Butte
<u>1979</u>	(X62)	78	75	85
<u>1980</u>	(X64)	77	83	77
<u>1981</u>	(X76)	78	89	98
	(X90)	80	91	92
	Average	<u>79.0</u>	<u>90.0</u>	<u>95.0</u>
<u>1982</u>	(X55)	85	74	100
	(X57)	86	88	102
	(X59)	84	78	92
	Average	<u>85.0</u>	<u>80.0</u>	<u>98.0</u>
<u>1983</u>	(X75)	72	75	80
	(X77)	73	77	82
	Average	<u>72.5</u>	<u>76.0</u>	<u>81.0</u>
<u>1984</u>	(X54)	74	87	89
	(X56)	77	82	85
	(X58)	76	84	85
	Average	<u>75.7</u>	<u>84.3</u>	<u>86.3</u>
6 - Year Average		77.9	81.4	87.1

## EXHIBIT D

Table 5. Leaf rust and leaf spot field ratings of Norak in comparison with Era and Butte in replicated small plot trials grown at Moorhead, MN from 1979-1984.

Year and Experiment No.		Leaf Rust			Leaf Spot <sup>1/</sup>		
		Norak	Era	Butte	Norak	Era	Butte
<u>1979</u>	(X62)	0	5S	0	1	1	1
<u>1980</u>	(X64)	0	5S	0	3	2	2
<u>1981</u>	(X76)	0	TS	5S	1	1	1
	(X90)	0	5MS	0	4	3	3
<u>1982</u>	(X55)	TR	5S	10S	1	2	3
	(X57)	TR	10S	30S	2	1	3
	(X59)	TR	10S	30S	3	1	7
<u>1983</u>	(X75)	0	10S	40S	4	3	3
	(X77)	0	10S	30S	3	2	2
<u>1984</u>	(X54)	0	5SS	20S	6	2	5
	(X56)	0	5MS	20S	6	3	7
	(X58)	0	TS	20S	5	4	6

<sup>1/</sup> Rating of foliar leaf diseases including Tan Spot, and Septoria species. Scale from 0-9, where 0=none and 9=complete leaf spot infection to the flag leaf.

## EXHIBIT D

Table 6. Quality characteristics of Norak and checks at Moorhead, Minnesota in 1980 and 1981.

Characteristics	1980			1981		
	Norak	Butte	Butte	Norak	Butte	Butte
Wheat Protein	14.55	14.35	15.10	15.30	14.70	16.00
Test Weight	61.8	63.2	62.2	61.8	61.2	61.3
Milling Ext. %	73.6 G	73.0 G	71.3 G	70.9 G	70.5 G	68.0 G-
Farinograph						
Absorption	61.1	62.0	65.0	58.4	60.7	65.0
Peak	20.0	18.0	11.0	24.0	9.75	11.25
Stability	26.50	14.50	22.00	31.50	23.00	25.00
MTI	15	25	10	15	15	20
Valorimeter	96	71	83	100	78	84
Flour						
Ash	.404	.398	.386	.393	.450	.364
Protein	13.55	13.35	14.10	14.25	13.60	14.80
Bake						
Absorption	64.0 G	65.0 G	68.0 VG-	62.5 G-	63.5 G	68.0 VG-
Mix	9.75 F-	44.50 VG	5.50 G-	11.0 F-	6.00 G-	55.50 VG
Dough	5 G-	6 G	5 G-	4 F	6 G	5 G
Leaf Vol. cc	1000 EX	1980 VG	1000 VG	1000 EX	1000 EX	1000 EX
Crumb grain	6 G	6 G	4 E	6 G	6 G	5 G
Crumb texture	6 G	6 G	4 F	5 G	6 G	4 F
Crumb color	97 G	97 G	97 G-	97 G-	97 G+	97 G
Bake Score	30 G	32 G	26 G-	28 G-	33 G+	32 G
Overall Score	63 G	63 G	57 G-	58 G-	64 G-	63 G-

## EXHIBIT D

Table 7. Quality characteristics of Norak and checks at Moorhead, MN in 1982.

Characteristics	Norak	Era	Butte	Waldron	Len	Marshall
Wheat Protein	13.90	14.05	14.75	15.10	15.45	14.40
Test Weight	62.9	62.9	63.8	62.2	63.0	62.7
Milling Ext. %	74.0 G+	70.6 G	70.7 G	70.0 G-	69.6 G-	73.5 G
Farinograph						
Absorption	56.8	59.3	61.6	60.5	61.7	58.3
Peak	13.25	66.25	9.00	8.25	12.25	5.00
Stability	20.00	12.00	15.50	19.50	22.50	6.50
MTI	20	30	25	20	20	55
Valorimeter	86	66	76	73	84	60
Flour						
Ash	.431	.408	.356	.372	.361	.447
Protein	13.15	12.50	13.05	14.20	13.90	12.75
Bake						
Absorption	59.5 F	62.50 G	64.5 G	63.5 G	64.5 G	61.0 G-
Mix	7.50 F	5.50 VG	5.00 VG	5.25 VG	6.25 G-	3.75 G
Dough	7 VG	6 G	7 VG-	7 VG-	6 G	6 G
Loaf Vol. cc	1000+	EX- 1880	VG 1000	1000+	EX- 11000	965 G
Crumb Grain	6 G	6 G	6 G	7 VG-	6 G	6 G
Bake Score	31 G	30 G	35 VG-	38 VG-	30 G	30 G
Crumb Texture	5 G	5 G	6 G	7 VG-	5 G	6 G
Crumb Color	97+ G	97+ G	97 VG-	97 VG-	96+	97
Overall Score	62 G	60 G	67 VG-	69 VG-	58 G-	58 G-

## EXHIBIT D

Table 8. Quality characteristics of Norak and checks at Moorhead, Minnesota in 1983.

Characteristics	Norak	Solar	Waldron
Wheat Protein	14.26	14.62	16.15
Test Weight	58.1	58.1	58.5
Milling Ext. %	67.6 F	72.0 G	66.0 F
Farinegraph			
Absorption	56.4	60.6	61.0
Peak	23.50	6.75	8.50
Stability	30.50	12.25	19.75
MTI	15	30	20
Valorimeter	98	66	74
Flour			
Ash	.463	.534	.440
Protein	12.95	12.99	14.04
Bake			
Absorption	61.5 G-	63.0 G	65.0 G
Mix	9.50 F-	5.00 VG	5.25 VG
Dough	4 F	7 VG-	7 VG-
Loaf Vol. cc	850 G	985 VG-	980 VG-
Crumb Grain	5 G-	6 G	6 G
Crumb Texture	5 G-	6 G	6 G
Crumb Color	97	97	97
Bake Score	22 F	34 G+	34 G+
Overall Score	50 F	64 G+	62 G

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